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~~38~~. The apparatus as recited in claim ~~36~~, wherein the handling mechanism is further configured to transport the semiconductor wafer to the detector and the thickness measurement tool.

REMARKS

Claims 1, 6, 9 and 17 have been amended to more clearly describe the claimed invention. Claims 10 and 12 have been canceled, and new claims 23-38 have been added. Claims 1, 4-6 and 9, 11, and 13-38 are now pending.

The Applicant believes that new claims 23-38 are supported by the original patent application. For example, support may be found in FIG. 11, in the detailed description section, page 21, lines 15-64, and page 22, lines 8-31, as well as in other locations within the application.

Independent claims 1, 6 and 17 recite a modular optical system placed above a window of a cooling stage of the plurality of interrelated integrated circuit manufacturing tools where the modular optical inspection system is outside of a vacuum processing environment. This is advantageous because it is very difficult to place equipment inside of vacuum-processing environments, such as a semiconductor wafer-processing environment. Vacuum environments are very small in size because of the difficulty in maintaining vacuums. The wafer manufacturing system of the present invention can be made to a smaller scale and for more economical costs because the window of the invention allows the modular optical inspection system to be placed outside of the vacuum processing system.

In contrast, the modular optical systems, disclosed by Morioka in Figure 22, are located in the high vacuum environment of a semiconductor factory automation device. Morioka never teaches or suggests that modular optical systems can be located outside a vacuum-processing environment of a semiconductor wafer-manufacturing device. Yamamoto et al. also does not teach nor suggest that modular optical systems can be located outside a vacuum-processing environment of a semiconductor wafer-manufacturing device.

Therefore, since Morioka and Yamamoto et al. do not teach or suggest all of the limitations of the claimed invention, Morioka and Yamamoto et al. render neither claim 1, 6 or 17 obvious under 35 U.S.C. 103(a). It is submitted that dependent claims 4-5 and 18-22 are also patentably distinct from Morioka and Yamamoto et al. for at least the same reasons as those recited above for their corresponding independent claims. These dependent claims further recite additional limitations that further distinguish these dependent claims from the cited references. The additional limitations recited in the dependent claims are not further discussed as the above discussed limitations are believed to be sufficient to distinguish the claimed invention from the

cited references. Thus, it is respectfully requested that the Examiner withdraw the rejection of claims 1, 4-6, 17-22 under 35 U.S.C § 103(a).

Independent claim 9 has been amended to more clearly define the invention. It is respectfully submitted that Morioka et al. and Yamamoto et al. do not teach or suggest all of the elements of claim 9. These dependent claims further recite additional limitations that further distinguish these dependent claims from the cited references. Thus, it is respectfully requested that the Examiner withdraw the rejection of claims 9-16 under 35 U.S.C § 103(a).

SUMMARY

It is respectfully submitted that all pending claims are allowable and that this case is now in condition for allowance. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

If any fees are due in connection with the filing of this Amendment, the Commissioner is authorized to deduct such fees from the undersigned's Deposit Account No. 50-0388 (Order No. KLA1P001C1). A duplicate copy of the transmittal sheet for this amendment is enclosed for this purpose.

Respectfully submitted,
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Four Times Amended) An integrated circuit manufacturing system comprising:

(a) a plurality of interrelated integrated circuit manufacturing tools capable of operating in parallel on a plurality of semiconductor wafers, wherein the plurality of interrelated integrated circuit manufacturing tools comprise a cluster tool;

(b) a modular optical inspection system disposed proximate **to a window of** a cooling stage of the plurality of interrelated integrated circuit manufacturing tools**, the modular optical inspection system being outside of a vacuum processing environment**, the modular optical inspection system including

a plurality of modular inspection subsystems each configured to detect defects on a portion of a semiconductor wafer,

a mechanism for moving at least one of the semiconductor wafer and the plurality of modular inspection subsystems with respect to one another, and

a master processor configured to process data delivered from at least some of the modular inspection subsystems, wherein a first one of the plurality of modular inspection subsystems includes a local processor configured to process data collected by the first modular inspection subsystem; and

(c) a handling tool for moving the semiconductor wafers among the plurality of manufacturing tools and the inspection system.

6. (Three Times Amended) In an integrated circuit manufacturing system including a plurality of interrelated integrated circuit manufacturing tools capable of operating in parallel on a plurality of semiconductor wafers, a method of inspecting a semiconductor comprising:

transferring the semiconductor wafer from one of the plurality of manufacturing tools to a modular optical inspection system that is disposed above a window of a cooling tool of the plurality of interrelated integrated circuit manufacturing tools**, the modular optical inspection system being outside of a vacuum processing environment**, the modular optical inspection system including a plurality of modular inspection subsystems each configured to detect defects on a portion of the semiconductor wafer, wherein the plurality of manufacturing tools comprise a cluster tool; and

moving at least one of the semiconductor wafer and the plurality of modular inspection subsystems with respect to one another such that each of the modular inspection subsystems

inspects, in a single pass across the semiconductor wafer, an associated region of the semiconductor wafer.

9. (Once Amended) A modular optical inspection system for inspecting a surface, the inspection system comprising:

a plurality of modular inspection subsystems each configured to detect defects on a portion of the surface; **[and]**

a mechanism for moving at least one of the surface and the plurality of modular inspection subsystems with respect to one another, wherein at least one of the plurality of modular inspection subsystems includes

(i) a two-dimensional sensor configured to receive light from the surface; and

(ii) a controller configured to control the relative speeds at which

data is read from the sensor and

the modular inspection subsystem and the surface are moved with respect to one another

such that the surface is imaged in a time-delay integration mode**,**

wherein all of the plurality of modular inspection subsystems include separate sensors and separate controllers, and wherein each controller causes one row of pixel data to be read from a respective two-dimensional sensor each time the at least one inspection subsystem moves by one pixel length with respect to the surface.

17. (Three Times Amended) A modular optical inspection system for inspecting a surface, the inspection system comprising:

a plurality of modular inspection subsystems each configured to detect defects on a portion of the surface;

a mechanism for moving at least one of the surface and the plurality of modular inspection subsystems with respect to one another; and

a master processor configured to process data delivered from at least some of the modular inspection subsystems,

wherein a first one of the plurality of modular inspection subsystems includes a local processor configured to process data collected by the first modular inspection subsystem, also wherein the modular optical inspection system is disposed above a window of a cooling tool of a plurality of integrated circuit manufacturing tools**, the modular optical inspection system being outside of a vacuum processing environment**, the plurality of integrated circuit manufacturing tools being a cluster tool.

Please **CANCEL** claims 10 and 12 without prejudice or disclaimer.

Please **ADD** claim 23-38 as follows:

--23. (New) An apparatus for processing semiconductor wafers comprising:

a wafer handling module containing an internal cavity, the wafer handling module having a port;

a process tool connected to the wafer handling module through the port;

a process sensor located proximate to the port; and

a handling mechanism located within the wafer handling module configured to transport a semiconductor wafer between the wafer handling module and the process tool.

24. (New) The apparatus as recited in claim 23, wherein the process sensor is an inspection tool.

25. (New) The apparatus as recited in claim 24, wherein the inspection tool is a modular optical inspection system that includes,

a plurality of modular inspection subsystems each configured to detect defects on a portion of the semiconductor wafer,

a mechanism for moving at least one of the semiconductor wafer and the plurality of modular inspection subsystems with respect to one another, and

a master processor configured to process data delivered from at least some of the modular inspection subsystems, wherein a first one of the plurality of modular inspection subsystems includes a local processor configured to process data collected by the first modular inspection subsystem.

26. (New) The apparatus as recited in claim 23, wherein the process sensor is a measurement tool.

27. (New) The apparatus as recited in claim 26, wherein the measurement tool measures the thickness of material layers deposited onto the semiconductor wafer.

28. (New) The apparatus as recited in claim 23, wherein the process tool is a single-wafer process tool or an ancillary function tool.

29. (New) The apparatus as recited in claim 23, wherein the handling mechanism is further configured to transport the semiconductor wafer to the process sensor.

30. (New) The apparatus as recited in claim 23, wherein the wafer handling module has a plurality of ports, the apparatus further comprising a plurality of process tools, each of the process tools connected to the wafer handling module through a respective port, the handling mechanism further configured to transport the semiconductor wafer between each of the plurality of process tools.

31. (New) The apparatus as recited in claim 30, wherein the processing tool is a cluster tool.

32. (New) The apparatus as recited in claim 30 wherein the processing tool is a phototrack tool.

33. (New) An apparatus for processing semiconductor wafers comprising:

a wafer handling module containing an internal cavity, the wafer handling module having a plurality of ports;

a plurality of process tools, each of the process tools connected to the wafer handling module through a respective one of the ports;

an inspection tool configured to detect defects on a semiconductor wafer, the inspection tool located proximate to a first one of the plurality of ports;

a thickness measurement tool configured to measure the thickness of materials deposited onto the semiconductor wafer, the thickness measurement tool located proximate to a second one of the plurality of ports; and

a handling mechanism located within the wafer handling module configured to transport the semiconductor wafer between the wafer handling module and each of the process tools.

34. (New) The apparatus as recited in claim 33, wherein the thickness measurement tool is a ellipsometer or a reflectometer.

35. (New) The apparatus as recited in claim 33, wherein the handling mechanism is further configured to transport the semiconductor wafer to the inspection tool and the thickness measurement tool.

36. (New) An apparatus for processing semiconductor wafers comprising:

a wafer handling module containing an internal cavity, the wafer handling module having a plurality of ports;

a plurality of process tools, each of the process tools connected to the wafer handling module through a respective one of the ports;

a detector configured to measure critical dimensions of integrated circuits upon a semiconductor wafer, the detector located proximate to a first one of the plurality of ports;

a thickness measurement tool configured to measure the thickness of materials deposited onto the semiconductor wafer, the thickness measurement tool located proximate to a second one of the plurality of ports; and

a handling mechanism located within the wafer handling module configured to transport the semiconductor wafer between the wafer handling module and each of the process tools.

37. (New) The apparatus as recited in claim 36, wherein the thickness measurement tool is a ellipsometer or a reflectometer.

38. (New) The apparatus as recited in claim 36, wherein the handling mechanism is further configured to transport the semiconductor wafer to the detector and the thickness measurement tool.--